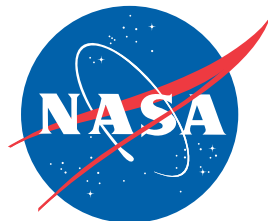


Climate Change Impacts on Water Resources and Irrigated Agriculture in the Central Valley of California

**Jonathan Winter¹, Charles Young², Marzieh Azarderakhsh³,
Alexander Ruane⁴, Cynthia Rosenzweig⁴**

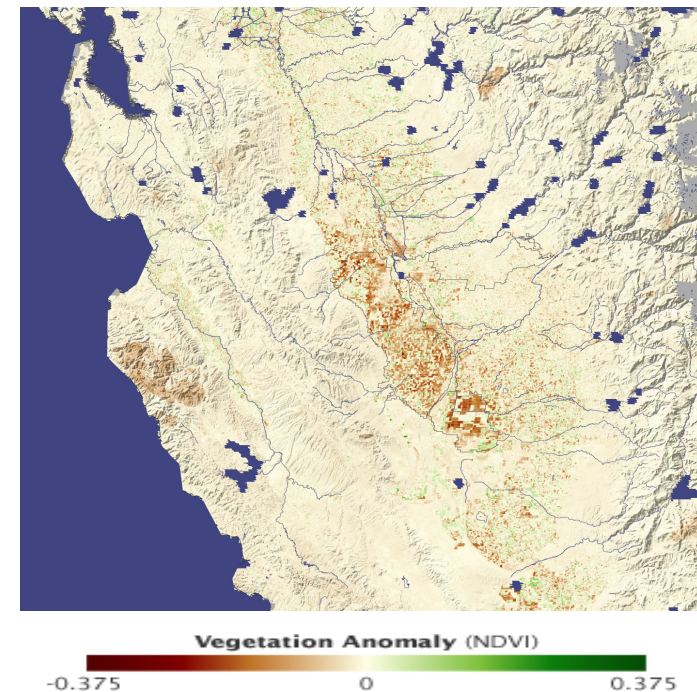
¹Dartmouth College, ²Stockholm Environment Institute, ³The City
College of New York, ⁴NASA Goddard Institute for Space Studies

February 26, 2014



Objectives

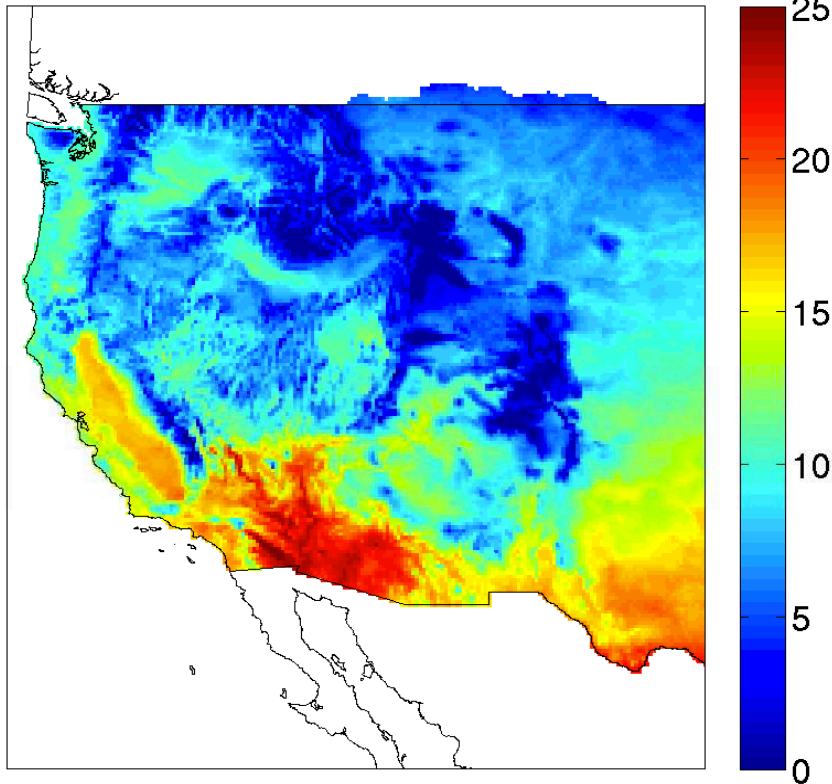
- Explore current and future water availability for irrigation across the Central Valley and broader western United States
- Improve the representation of crops in a hydrologic model
- Simulate current and future available water throughout the Central Valley and distributions of that water among competing uses
- Assess the impacts of future water availability on crop evapotranspiration and yields in irrigated agricultural areas
- Evaluate water resources across the western US



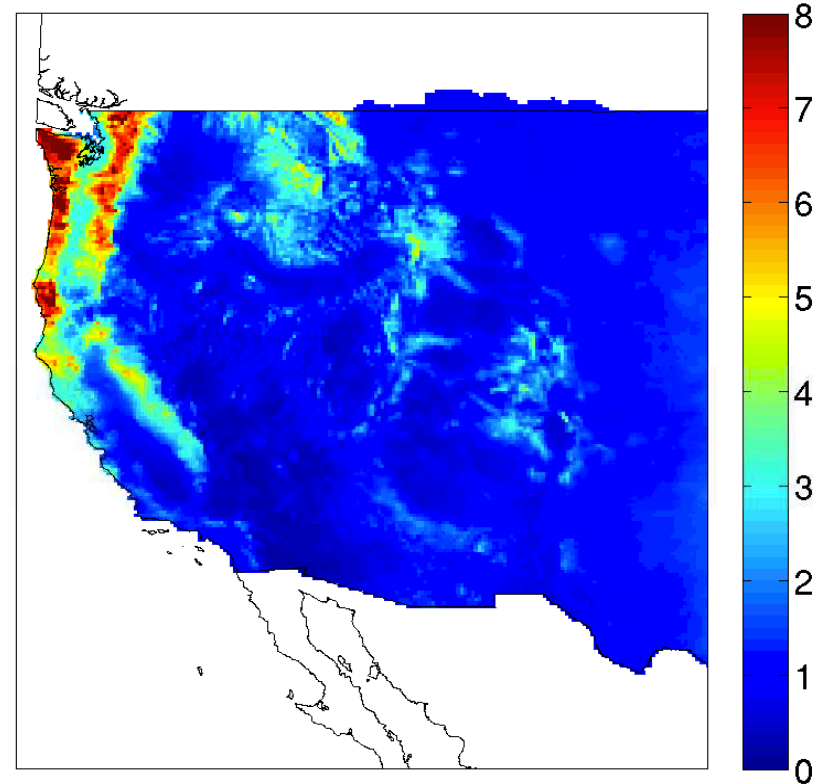
Climate

- Surface temperature and precipitation observations for 1980-2009, and 1998-2009 TRMM observations

Observed Temp [$^{\circ}\text{C}$]

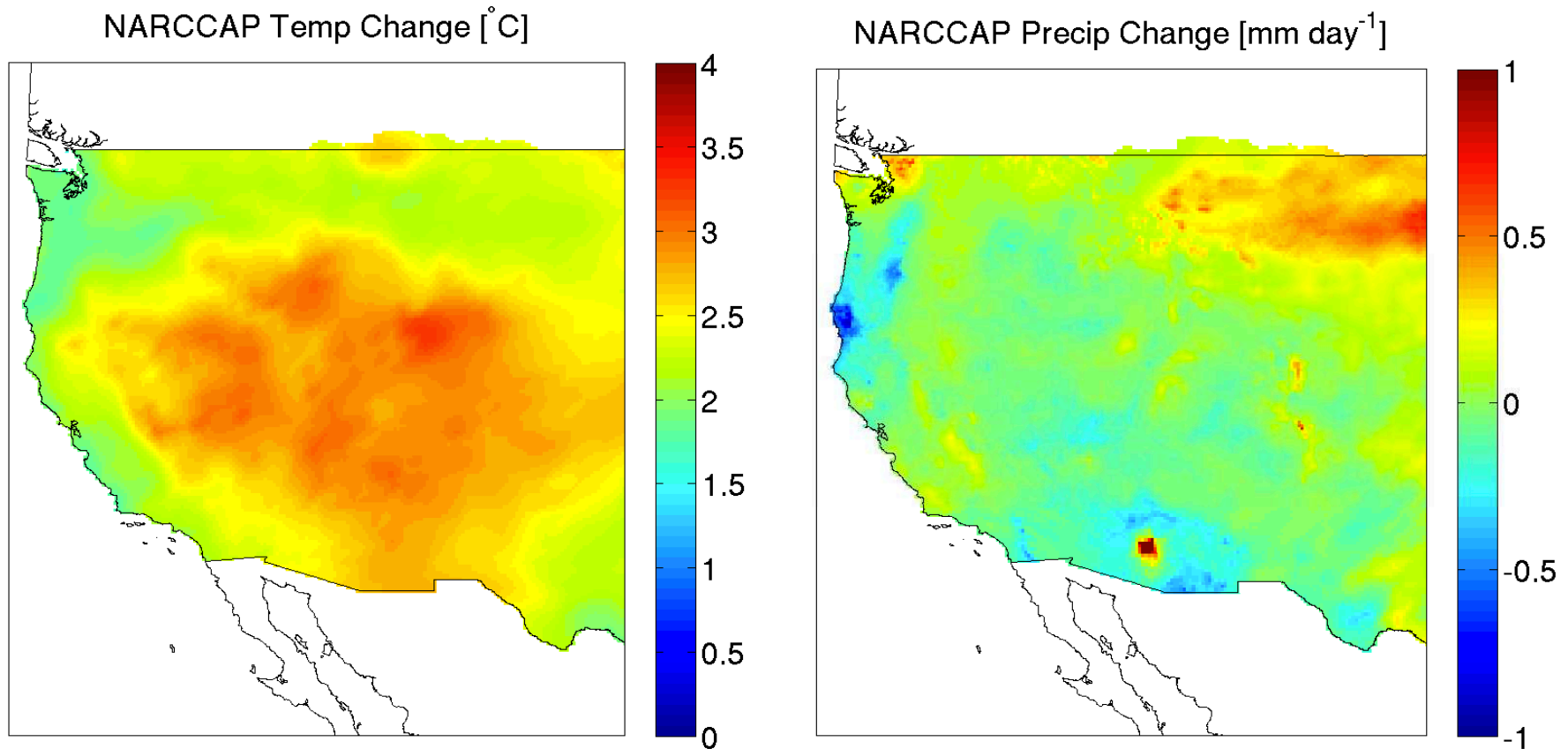


Observed Precip [mm day^{-1}]



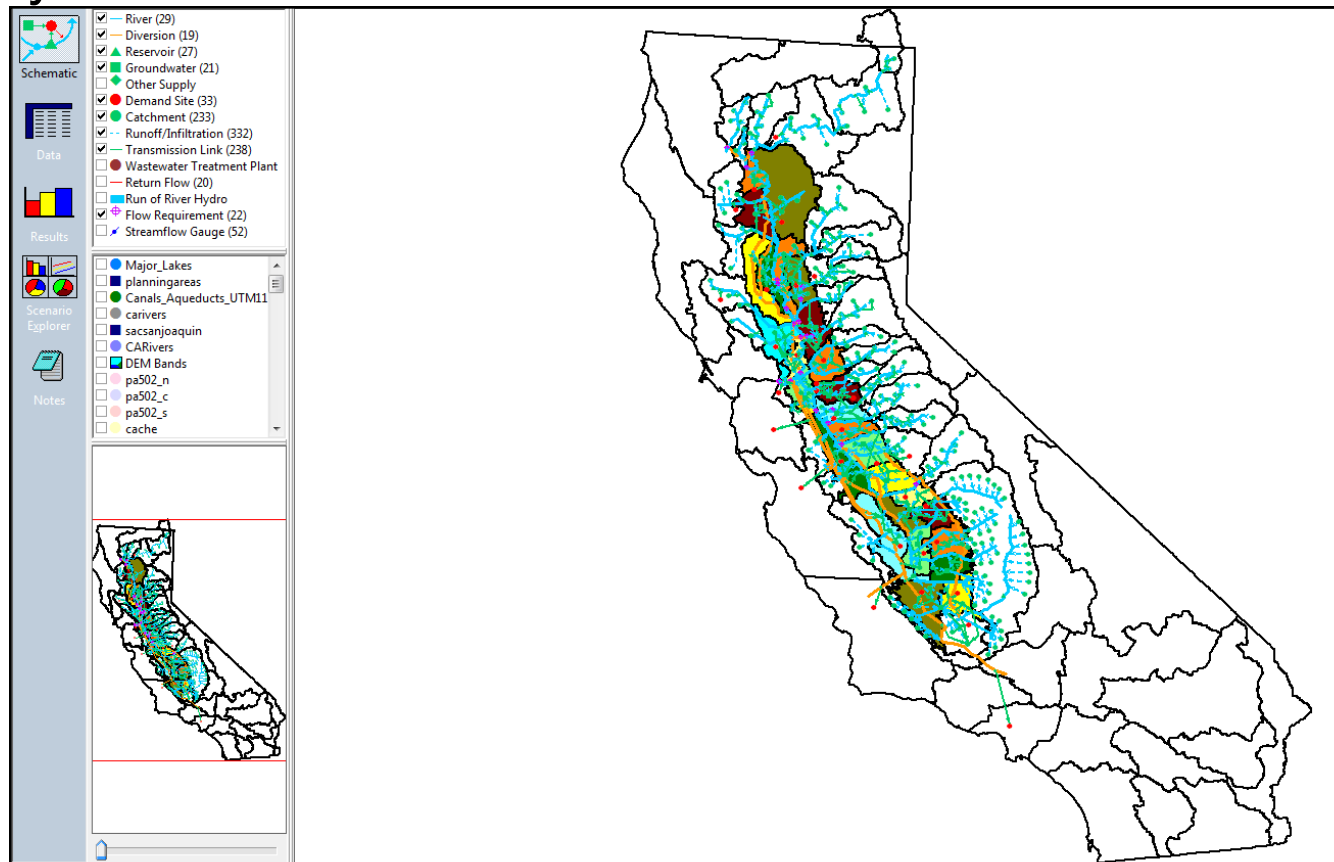
Climate Change

- Difference between NARCCAP 2050-2069 and NARCCAP 1980-1999 temperature and precipitation

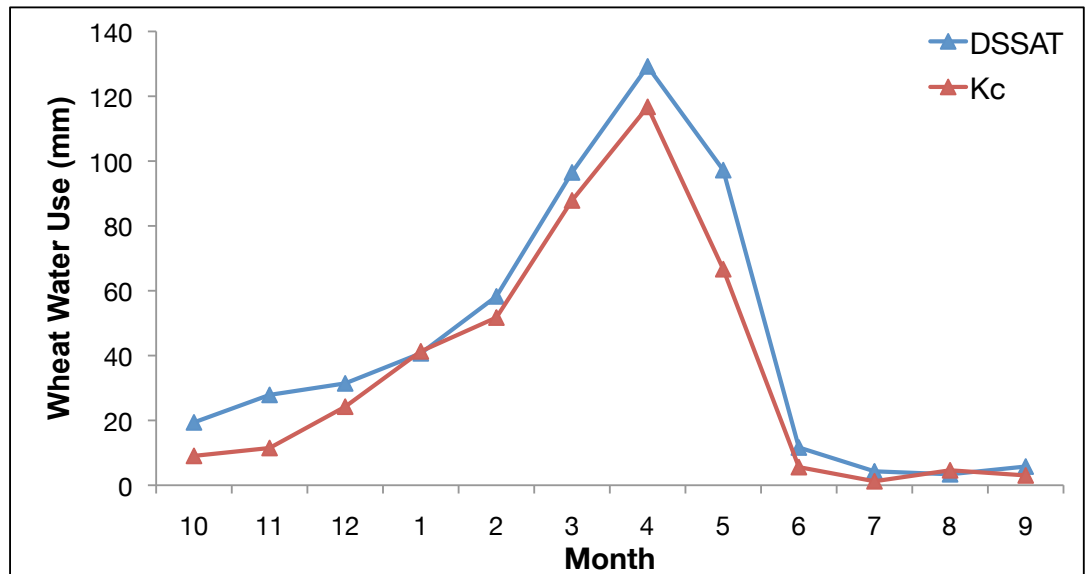
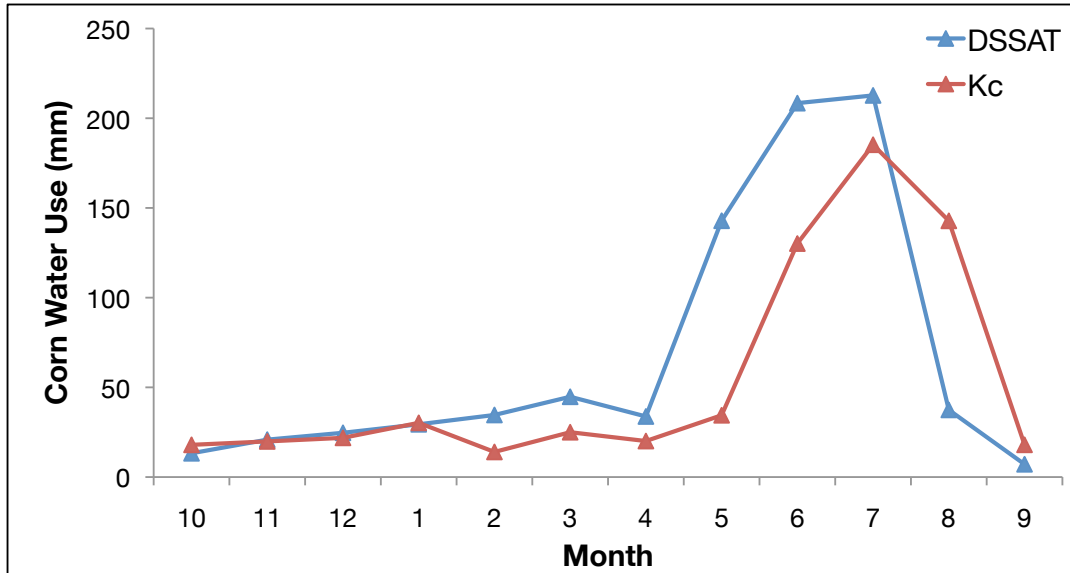


Water Resources and Crops

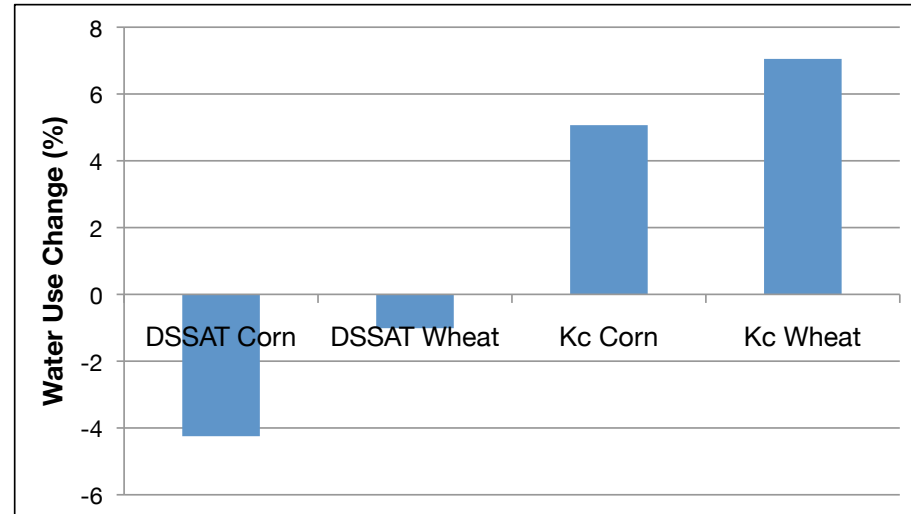
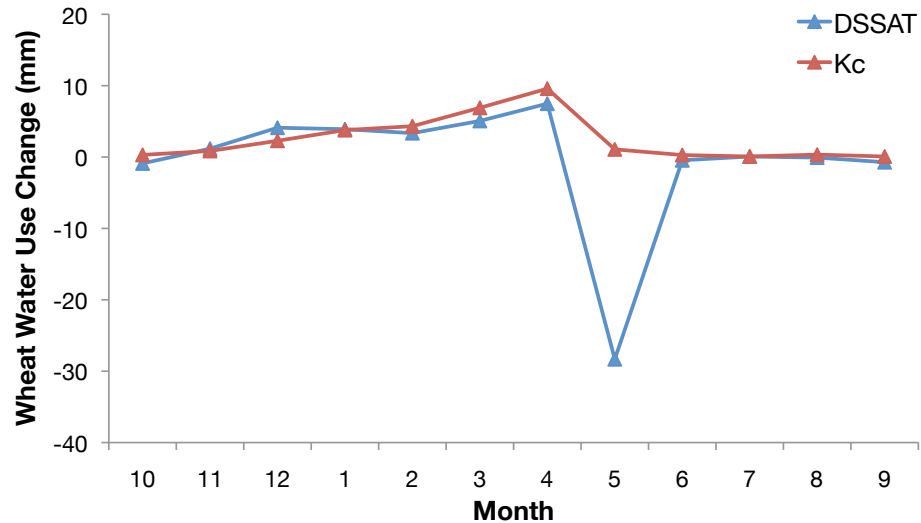
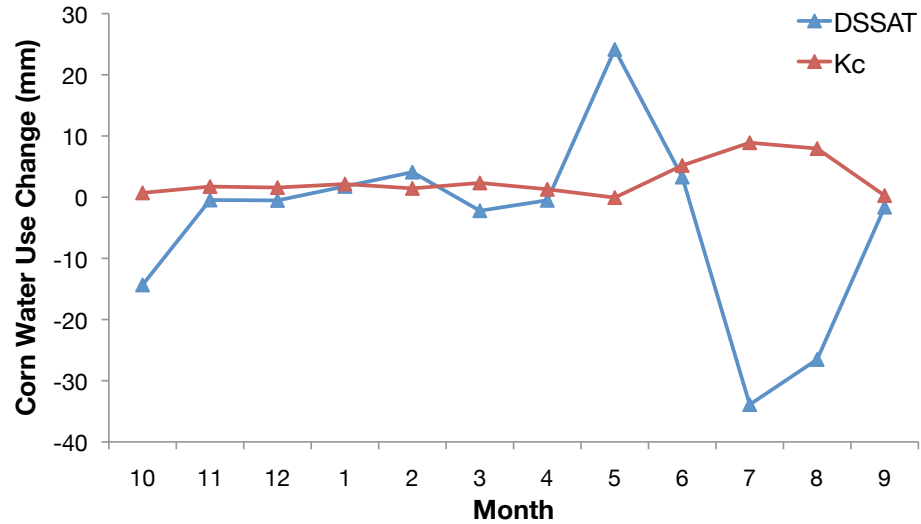
- Coupled Decision Support System for Agrotechnology Transfer Model (DSSAT) to Water Evaluation and Planning System (WEAP) and deployed over California's Central Valley



Crop Water Use

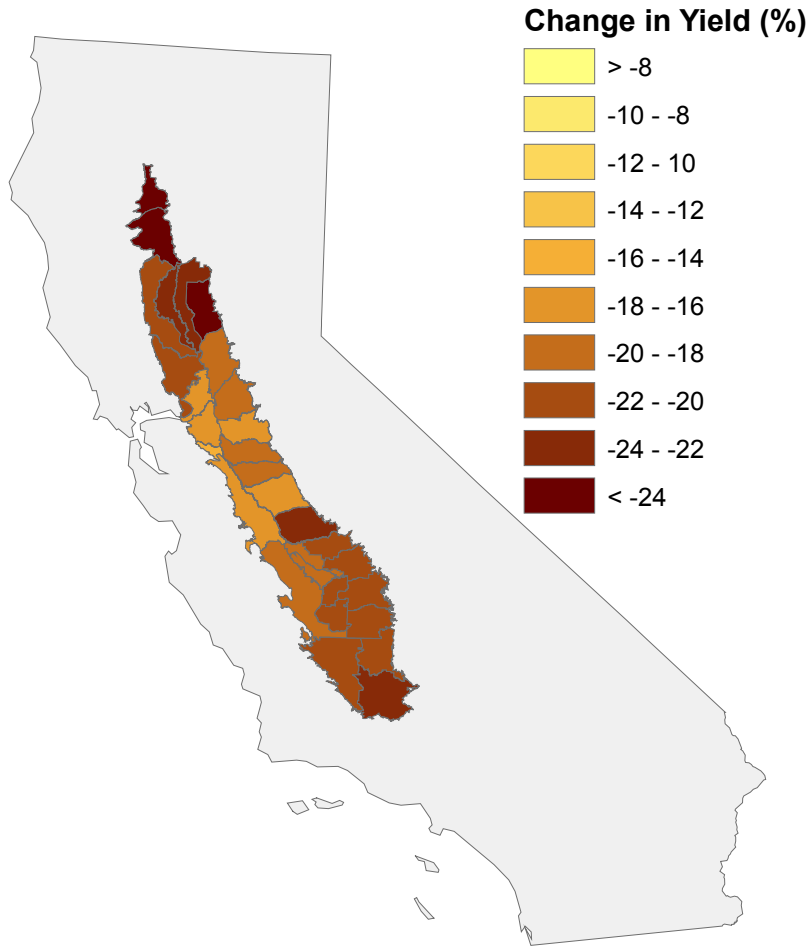


Crop Water Use Change

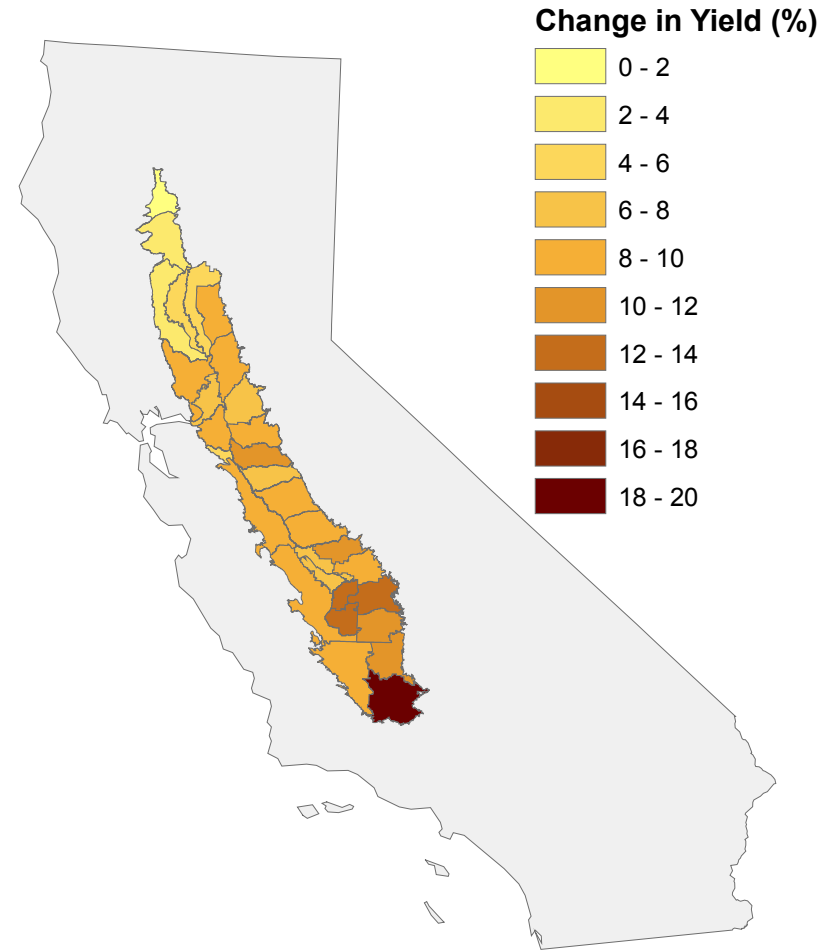


Yield Changes

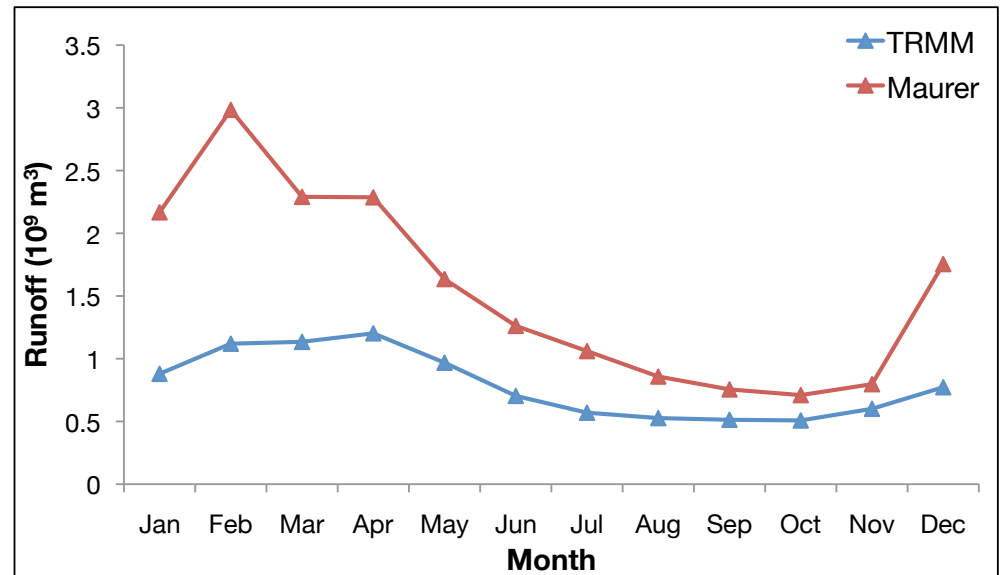
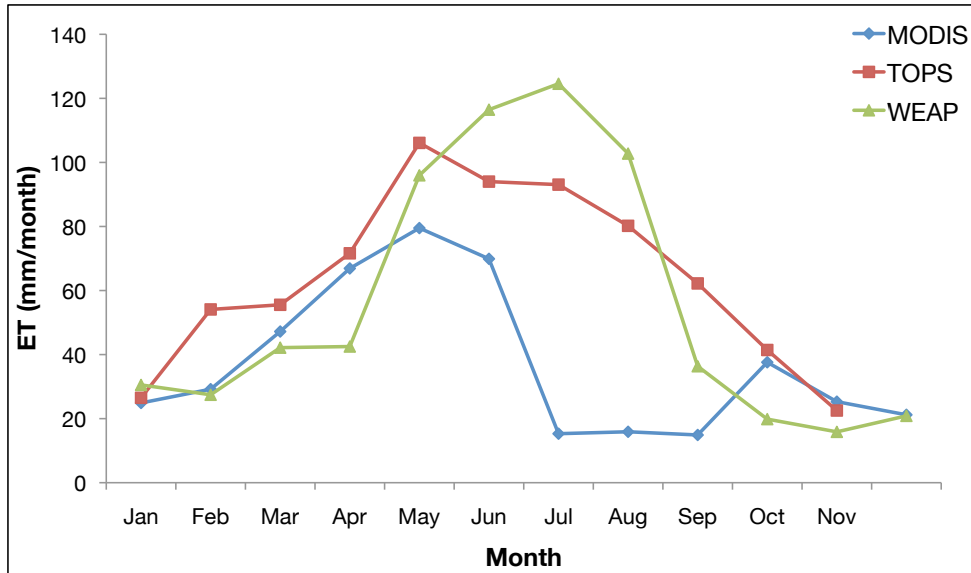
Corn



Wheat



ET Evaluation and Runoff Sensitivity



Next Steps

- Involve Yolo County Flood Control and Water Conservation District (YCFCWCD) in model development and application
- Reduce uncertainty in the crop water use calculations through the use of satellite data, including evapotranspiration, surface temperature, land cover, and crop coefficients
- Construct a decision-making tool that simulates the Solano Decree, which determines the availability of surface water for YCFCWCD
- Link DWR's IWFM to WEAP, use to explore long-term planning of YCFCWCD groundwater infrastructure
- Clear synergies with fallow area mapping, snowpack assessments, groundwater measurements



- AgMIP: International effort linking the climate, crop, and economic modeling communities to produce the next generation of climate change impacts projections for the agricultural sector
- AgMIP Water: Develop projects that assess the effects of climate change and variability on irrigated crops in the United States and throughout the world, as well as build collaborative opportunities to create a portfolio of research at the interface of water and agriculture within the AgMIP framework

